College of the Holy Cross, Fall 2016
Math 136, section 2 – Makeup Midterm Exam 2
Monday, October 31

Your Name: ______________________________

Instructions: For full credit, you must show *all work* on the test pages and place your final answer in the box provided for the problem. Use the back of the preceding page if you need more space for scratch work. The numbers next to each part of the questions are their point values. I will be liberal with partial credit, so even if you don't see how to complete a problem, do as much as you can and be sure to write what you know.

Please do not write in the space below

Problem	Points/Poss
I	/ 60
II	/ 30
III	/ 10
Total	/100

I.

A. (15) Integrate by parts: $\int x^2 \cos(3x)\ dx$

Answer:

B. (15) Integrate using appropriate trigonometric identities: $\displaystyle\int \sin^4(2x)\cos^5(2x)\ dx$.

Answer: $\boxed{}$

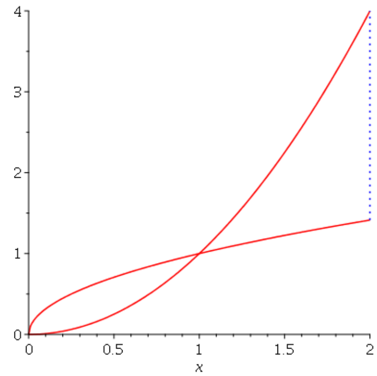
C. (20) Integrate with a trigonometric substitution: $\displaystyle\int \frac{x^3}{\sqrt{16+x^2}}\,dx$. (Partial credit points will be given as follows: 5 points for the substitution equation $x = \ldots$, and the computation of dx, 5 points for the conversion to the trigonometric integral, 5 points for the integration of the trigonometric integral, 5 points for conversion back to the equivalent function of x.)

Answer: $\boxed{}$

D. (10) Integrate with any applicable method we have discussed: $\int x^3 \ln(2x)\ dx$

Answer: $\boxed{}$

II. All parts of this question refer to the region R bounded by the graphs $y = \sqrt{x}$ and $y = x^2$, $x = 0$ and $x = 2$:



A. (10) Set up and compute integral(s) to find the area of R.

Area =

B. (10) The portion of the region R between $x = 0$ and $x = 1$ is rotated about the x-axis to generate a solid. Set up and compute an integral to find its volume.

Volume = $\boxed{}$

C. (10) A solid has the portion of the region R between $x = 0$ and $x = 1$ as base. The cross-sections by planes perpendicular to the x-axis are equilateral triangles with side extending from the lower boundary to the upper boundary of the region. *Set up* an integral to find the volume. You do not need to compute this one, but if you do correctly, I will give 10 points Extra Credit.

Volume = $\boxed{}$

III. (10) Suppose that a region R defined by $0 \leq y \leq f(x)$ and $a \leq x \leq b$ has area A and lies above the x-axis. When R is rotated about the x-axis it sweeps out a solid with volume V_1. When R is rotated about the line $y = -k$, where $k > 0$, it sweeps out a solid with volume V_2. Express V_2 in terms of V_1, k, A.

Volume $V_2 =$ $\boxed{}$